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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/538,534

06/10/2005

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EXAMINER

SHAW, AMANDA MARIE

ART UNIT

PAPER NUMBER

1634

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

01/18/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/538,534	<b>Applicant(s)</b> FRASCH ET AL.	
	<b>Examiner</b> Amanda M. Shaw	<b>Art Unit</b> 1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 04 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) 18-25 and 33-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 26-32 is/are rejected.
- 7) ☒ Claim(s) 8 and 17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 6/10/2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/9/06 and 6/10/05</u> . | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. Claims 1-37 are currently pending. Applicant's election without traverse of Group I in the reply filed on December 4, 2006 is acknowledged.

Claims 18-25 and 33-37 have been withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected subject matter, there being no allowable generic or linking claim. Accordingly, Claims 1-17 and 26-32 have been examined herein.

Additionally it is noted that in the response filed December 4, 2006 Applicants argued that since claim 17 is dependent on claim 16 that it should belong in Group I. This argument was fully considered and the examiner agrees that claim 17 should belong in Group I. Therefore Group I now consists of claims 1-17 and 26-32, Group II now consists of Claims 18-25, and Group III consists of Claims 33-37.

### ***Claim Objections***

2. Claims 8 and 17 objected to because of the following informalities: the claims recite "a detection DNA stand" when they should recite "a detection DNA strand". Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-7, 9-16, and 26-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda et al (Nature 2001) in view of Yu (The Journal of Physical Chemistry 1997) and in further view of Stevens (US Patent 3972619 1976).

Regarding Claims 1-7 and 9-15 and 26-Yasuda et al teach a method which comprises: providing a molecular structure which rotates (F1-ATPase), attaching a gold nanoparticle to the rotating structure so that the nanoparticle rotates with the molecular structure and detecting the rotation using laser dark field microscopy (Page 898 and Fig 1).

Yasuda et al does not teach a method wherein the rotation is detected by exposing a light to the nanoparticle, wherein a first surface of the nanoparticle scatters a first wavelength of the light when the nanoparticle is in a first position and a second surface of the nanoparticle scatters a second wavelength of the light when the nanoparticle is in a second position; and filtering the first and second wavelengths of the light through a polarizing filter to detect rotational motion by observing alternating first and second wavelengths of the light. Further Yasuda et al do not teach a method wherein the nanoparticle is a gold nanorod that has a first and a second surface wherein the first surface has greater area. Yasuda do not teach that the first

wavelength of light (red) is longer than the second wavelength of light (green).

Additionally Yasuda do not teach that the anisotropy is detected using a polarizing filter.

However Yu et al describe the absorption spectral features of gold nanorods. Specifically Yu et al teach that gold nanorods have two different surfaces and thus have two surface plasmon resonances due to the anisotropy of the shape. The dominant SP1 band corresponds to longitudinal resonance and when exposed to light scatters a longer wavelength (red). The weaker band corresponds to transverse resonance and when exposed to light scatters a shorter wavelength (green) (Page 6662 and 6664). Thus it is an inherent property of the anisotropic gold nanorod that as it rotates the rotation can be detected observing alternating first and second wavelengths of the light.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Yasuda et al by using a gold nanorod in place of a nanosphere and detecting rotation by observing alternating first and second rotations of light as suggested by Yu. A method which uses a gold nanorod opposed to a gold nanosphere makes it possible to observe a rotational motion because gold nanospheres have two different surface plasmon resonances which makes it possible to observe alternating first and second wavelengths of light, while gold nanospheres only have one surface plasmon resonance and only produce a single wavelength of light as taught by Yu (Page 6662 and 6664). Further using polarizing filters to detect fluorescent anisotropy is routinely performed in the art as demonstrated by Stevens (See Abstract).

4. Claims 8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yasuda et al (Nature 2001) in view of Yu (The Journal of Physical Chemistry 1997) and in further view of Felder (US Patent 6232066).

The teachings of Yasuda et al and Yu et al are presented above in paragraph 3.

The combined references do not teach a method which further includes a step of disposing a detection DNA strand between the nanoparticle and the molecular structure, wherein the detection DNA strand hybridizes with a target DNA strand, if the target DNA strand matches the detection DNA strand, to form a structural link between the molecular structure and the nanoparticle.

However Felder teach an array of probes comprising anchor oligonucleotides immobilized to the substrate and a linker oligonucleotide attached to the anchor oligonucleotides. In the presence of a target nucleic acid, the target binds to the said linker followed by the hybridization of a detector oligonucleotide which has a reporter (Columns 1-2 and Figure 1). Thus the linker oligonucleotide and the target nucleotide form a structural link between the anchor and the nanoparticle.

Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the method of Yasuda et al by using a nucleic acid strand to attach the nanoparticle to the molecular structure as suggested by Felder because hybridization methods which use linker oligonucleotides attached to a solid support which bind to target nucleotides attached to detection molecules were routinely performed in the art as demonstrated by Felder. One would be motivated to

Art Unit: 1634

use nucleic acids rather than streptavidin for the benefit of being able to detect hybridization (Columns 1-2).

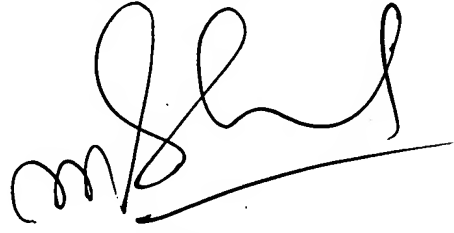
### **Conclusion**

5. No Claims are allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amanda M. Shaw whose telephone number is (571) 272-8668. The examiner can normally be reached on Mon-Fri 7:30 TO 4:30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached at 571-272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Amanda M. Shaw  
Examiner  
Art Unit 1634



RAM R. SHUKLA, PH.D.  
SUPERVISORY PATENT EXAMINER